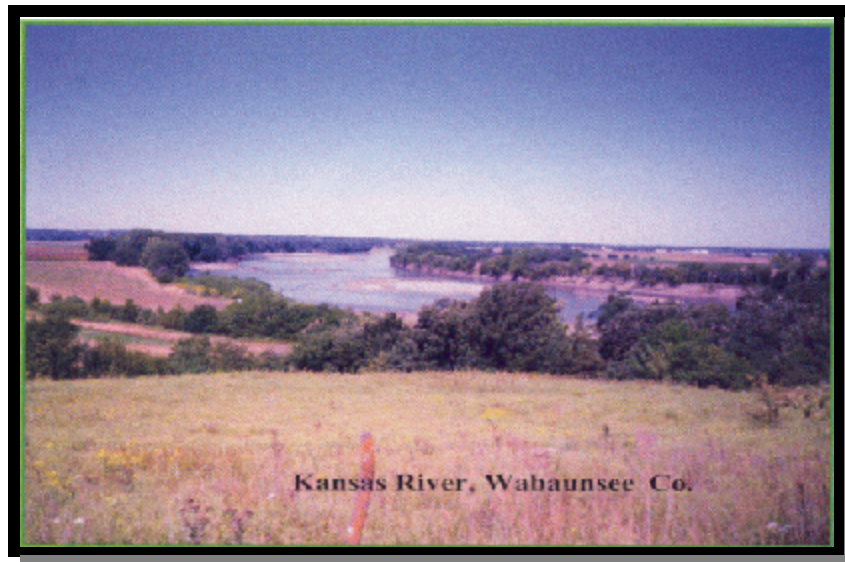


# **A Watershed Conditions Report For the State of Kansas HUC 10270102 (Middle Kansas) Watershed**



Kansas Department of Health & Environment  
Bureau of Water  
Watershed Management Section  
1000 SW Jackson  
Topeka, KS 66612



# **Watershed Conditions Report For HUC 8 10270102(Middle Kansas)**

Prepared by  
Kansas Department of Health and Environment (KDHE)  
Nonpoint Source Section  
10/5/00

## **EXECUTIVE SUMMARY**

This Watershed Conditions Report is designed to serve as a water quality “atlas”, and is intended to provide stakeholders in water quality with a tool to assess the quality of water resources within their watershed. Surface water quality for HUC 8 10270102 streams and rivers is generally fair to poor with a little over half of the surface water bodies not meeting their designated uses. The primary pollutant concern within HUC 8 10270102 streams and rivers is fecal coliform bacteria (FCB). FCB is a bacteria present in human and animal waste. It serves as an indicator of potential disease causing organisms. Additional pollutant concerns within the watershed include ammonia, excess nutrients and sediment. Ammonia is a chemical which is toxic to fish and aquatic organisms. Excess nutrients such as phosphorous or nitrogen can cause an abundance of plants and algae, which use up oxygen in the water, suffocating fish and aquatic organisms. Sediment loading is a result of erosion as the bare soil enters the water body and settles to the bottom. Sediment decreases water clarity and eventually decreases water storage capacity. Silt also carries phosphorous into the reservoir, which can accelerate eutrophication.

Within Huc 10270102 there are several small lakes. The primary pollutant concern for these small lakes is eutrophication. Eutrophication is a natural process which creates conditions favorable for algae blooms and excess plant growth. This process is often accelerated by excess nutrient loading from the watershed. Additional pollutant concerns for lakes within this watershed include excess biomass and an insufficient flow of water. Insufficient flow is a term used for a lack of water flowing into a lake. This can cause the lake to have a low temperature, low dissolved oxygen, and stagnation.

Groundwater resources in HUC 8 10270102 include Alluvial aquifers of the Kansas River and it's tributaries along with portions of the Glacial Drift aquifer. Water from these aquifers is very hard with naturally occurring minerals and nitrate as the primary pollutant concerns.

## **PURPOSE**

The Watershed Conditions Report is designed to serve as a water quality “atlas” for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the quality of water resources within their watershed.

## **BACKGROUND**

The Clean Water Act mandated that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State’s watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II are watersheds in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE then assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, Lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Loads (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

## Streams and Rivers

### **HUC 8 10270102**

The Huc 8 10270102 watershed is ranked fourth in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, approximately 52% percent of the total miles of water in this watershed do not meet their designated uses. This watershed contains one large river and many small streams, tributaries and creeks. The Kansas River, Mill Creek, Spring Creek, and Vermillion Creek are among the larger rivers and creeks. See Attachment 1 for a map of streams and rivers in HUC 8 10270102.

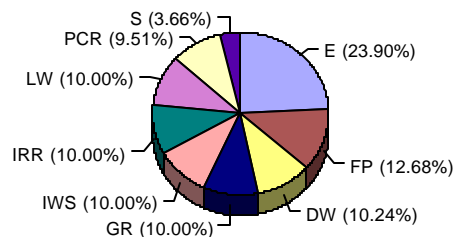
### Designated Uses

This watershed is mostly a drainage basin for the Kansas River, however several smaller streams and creeks are also abundant. There are 150 public water supplies within the watershed, many of which draw water from the Kansas River. According to the Kansas Surface Water Register, the most common designated use for streams and rivers in this watershed include: expected aquatic life uses, food procurement and domestic water supply.

**Figure 1**

pS=Special Aquatic Life Use Water  
pE=Expected Aquatic Life Use Water  
pFP=Food Procurement  
pDWS=Designated for domestic water supply  
pGR=Designated for ground water recharge.  
pLW=Designated for livestock watering use.  
pIWS=Designated for industrial water supply  
pIRR=Designated for irrigation use.  
pPCR=Primary contact recreation.

**Huc 8 10270102 Stream/River Uses**

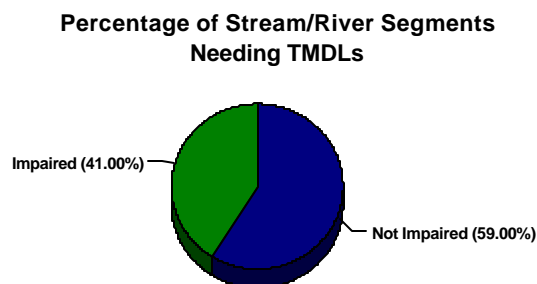


### TMDL/Contaminate Concerns

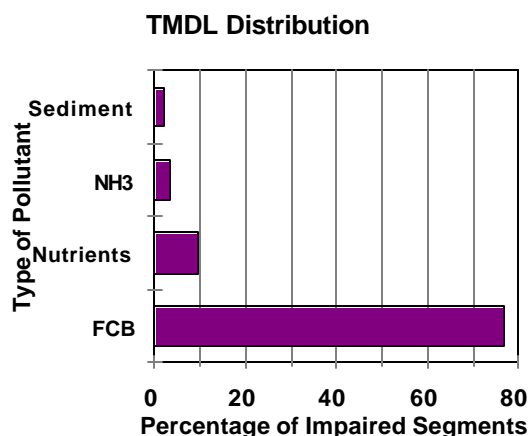
Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses. The figures below display the impairments of the streams and rivers based on the number of segments sampled.

Surface waters not meeting their designated uses will require total maximum daily loads. As shown in Figure 2, 41% of the stream/river segments sampled are impaired and require TMDLs. The primary pollutant concerns of this watershed's streams and rivers is fecal coliform bacteria (FCB). Fecal coliform bacteria is a bacteria present in human and animal waste. It serves as an indicator of potential disease causing organisms. Figure 3 shows that approximately 76% of these impaired stream/river segments are impaired by FCB, 9% by excess nutrients, 3% by ammonia (NH<sub>3</sub>), and 1% by sediment. Ammonia is a chemical which is toxic to fish and aquatic organisms. Sediment loading is a result of erosion as the bare soil enters the lake and settles to the bottom. Sediment increases the cloudiness of the lake, creates a displeasing color, and fills the lake bottom. Excess nutrients such as phosphorous or nitrogen causes an abundance of plants, which use up oxygen in the water suffocating fish and aquatic organisms.

**Figure 2**



**Figure 3**



### **Potential Pollution Sources**

Potential sources of FCB contamination include feedlots, wastewater treatment facilities, septic systems, and wildlife. Potential sources of sediments include construction sites, stream bank erosion, and row crop agriculture. Potential sources of nutrients include row crop agriculture, urban/suburban runoff, registered feedlots, unregistered feedlots, wastewater treatment facilities, septic systems, and wildlife. Sources of ammonia include livestock, septic tanks, fertilizer, municipal and industrial waste.

Analyzing the land uses within this watershed helps to understand which land uses might have greater influences on the source of the impairments. Below is a list of the land uses in this watershed.

p Urban Area.... 2.5%	p Wooded area....5.8%
p Row Crop....17.2%	p Water area.... .8%
p Grassland....72.8%	p Other.... .7%

**Feedlots:** In the State of Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 170 registered CAFOs located within HUC8 10270102 (this number, which is based on best available information, may be dated and subject to change). Waste disposal practices and waste water effluent quality are closely monitored by KDHE for these registered CAFOs. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

**Wastewater Treatment Facilities:** There are approximately 54 wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits specify the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

**Septic Systems:** There are currently thousands of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or “failing” septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and County health departments may provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

**Wildlife:** Wildlife located throughout the watershed are not usually considered a significant source of nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

**Row Crop Agriculture:** As stated above, approximately 17.2% of the watershed’s land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

**Urban/Suburban Runoff:** Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 6% urban. Limiting paved surfaces is the key to slowing urban nonpoint source pollution. The use of grass swales, open spaces, and storm water retention ponds are recommended to slow runoff in urban areas.

The watershed has an increasing population living in suburban areas. Residential landscapes are often designed with large turf areas which require high amounts of water and chemicals to maintain. The use of excessive amounts of fertilizers and lawn care chemicals in residential areas can contribute a significant amount of pollution to nearby water resources. Suburban nonpoint source pollution can be limited by: using less lawn fertilizers and chemicals; control of construction sites; proper disposal of pet waste; establishing large areas of native vegetation; and conserving the amount of water use for plant maintenance.

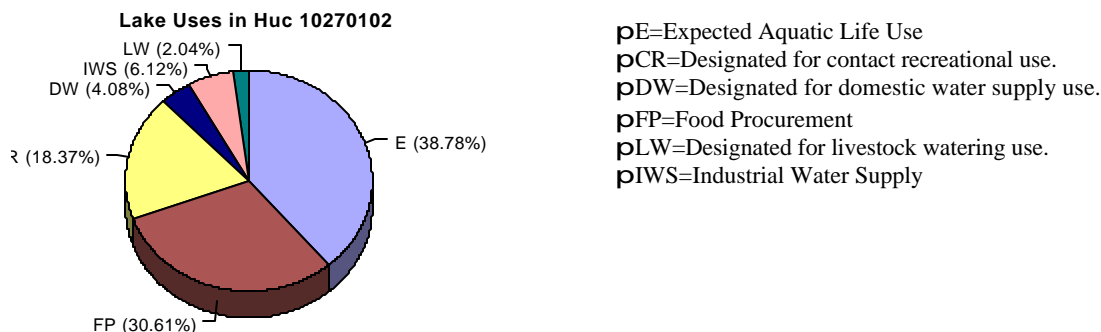
## Lakes & Wetlands

Huc 8 10270102 is the home to Warren Park Lake, Lake Shawnee, Wabaunsee County Lake, and several smaller city and county lakes. Many of these lakes are used for recreational activities such as camping, water skiing, fishing, and sight seeing. See Attachment 2 for a map of the lakes in HUC 8 10270102.

### Designated Uses

According to the Surface Water Register, the majority of the lakes in this watershed are designated for expected aquatic life use, food procurement, contact recreation and domestic water supply.

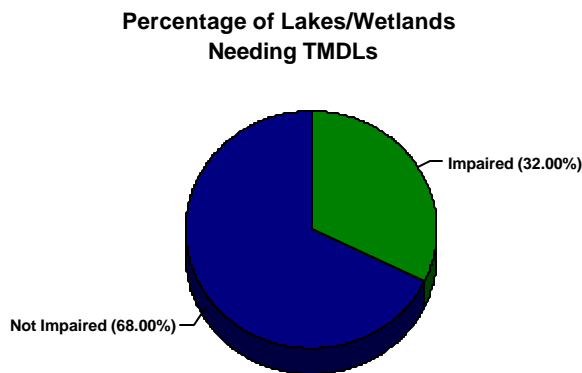
**Figure 4**



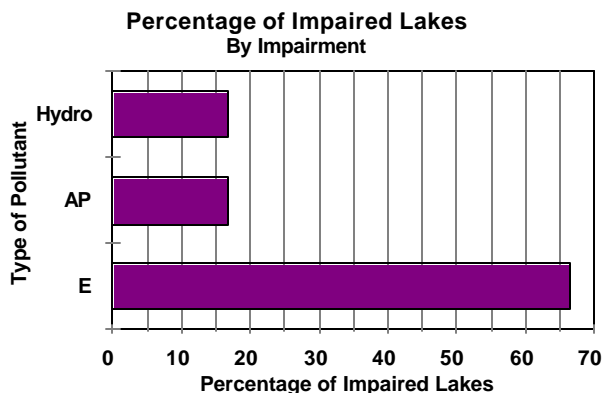
### TMDL/Contaminate Concerns

Surface waters not meeting their designated uses will require total maximum daily loads. Figure 5 shows that approximately 32% of the lakes in this watershed require TMDLs. The primary pollutants for this watershed's lakes and wetlands are eutrophication (E), excessive biomass (AP), and insufficient flow (hydro). As shown in Figure 6, 66% of the impaired lakes/wetland segments are impaired due to eutrophication. The remaining pollutants, biomass (AP) and hydro are present in over 16% of the lakes. Eutrophication is caused by excess nutrients from a variety of nitrogen and phosphorous sources including row crop agriculture, feedlots, septic systems, and urban/suburban runoff. Excessive biomass is an abundance of vascular plants that tend to be a nuisance and interfere with designated water uses. Hydro is a term used for lack of water flowing into a lake. This can cause the lake to have a low temperature, low dissolved oxygen, and stagnation.

**Figure 5**



**Figure 6**



### **Potential Pollution Sources**

Based on the watershed's land use percentages, the primary pollutant sources for nutrients causing eutrophication may be row crop agriculture. Additionally, feedlots, septic systems, and urban/suburban runoff may contribute significant amounts of nutrients into the watershed.

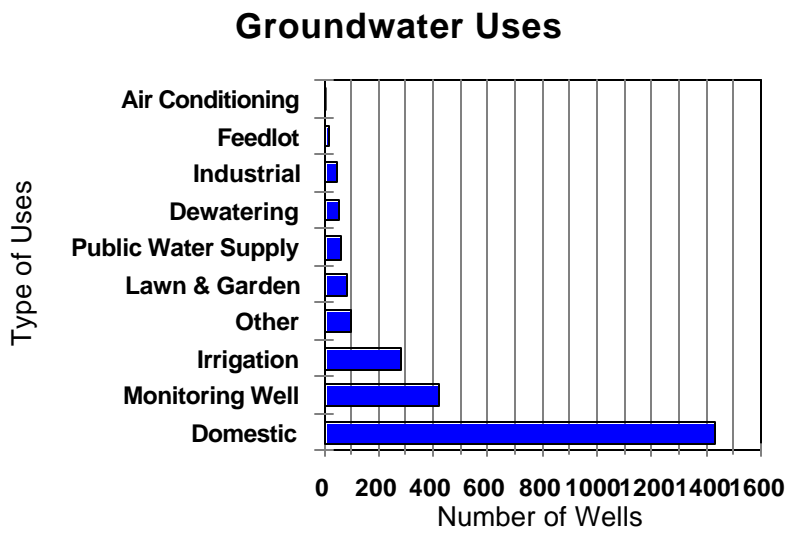
### **Groundwater**

Major groundwater aquifers underlying this watershed include portions of the Glacial Drift and Alluvial aquifers of the Kansas River and its tributaries. See attachment 4 for a map of groundwater aquifers within this watershed.

### **Designated Uses**

There are approximately 2,450 groundwater wells located within the watershed. Water from these wells is used for domestic use, groundwater monitoring, irrigation, lawn & garden, and several other uses as shown below.

Figure 7





### **Aquifer Characteristics**

**Glacial Drift Aquifer:** Portions of the Glacial Drift aquifer exist in the northwest portion of the watershed. Water from this aquifer is often used for rural domestic water supply. Historically, water from this aquifer is very hard with nitrates being one of the primary pollutant concerns.

**Alluvial Aquifer:** Alluvial aquifers of the Kansas River and its tributaries exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located within the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

### **Potential Pollution Types and Sources**

Common groundwater pollutants include: nitrates, chloride, sulfates, ammonia, iron, manganese and voc's. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

**Nitrate:** Nitrate is a naturally compound mineral and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including “blue baby” syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

**Chloride:** Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, often due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

**Ammonia:** Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

**VOCs:** Volatile Organic Compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

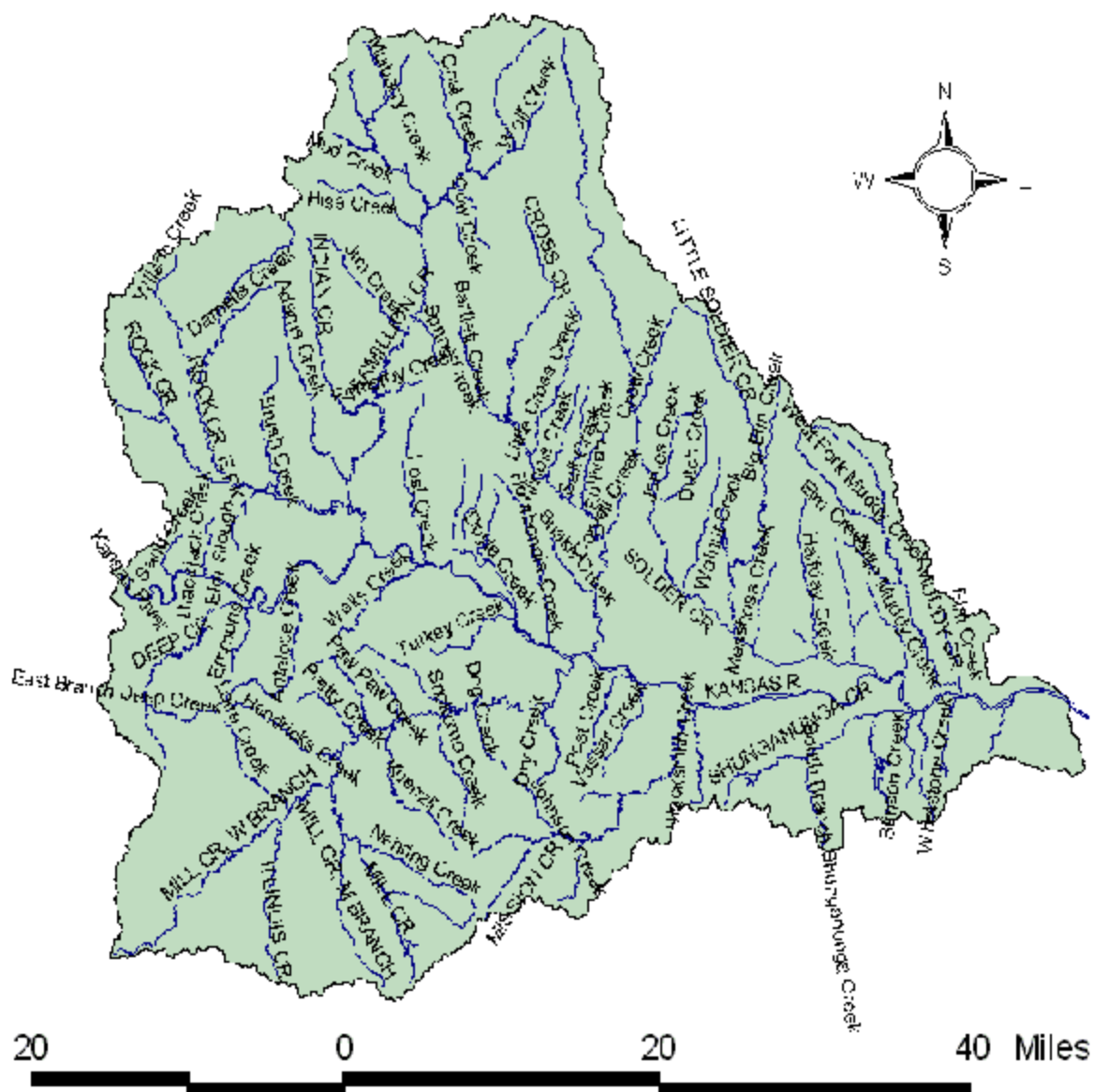
**Iron:** Iron is a naturally occurring element found in the soil throughout Kansas. It is an annoyance as it has an objectionable taste, causes a red stain to porcelain fixtures and laundry, and causes plumbing irritations.

**Manganese:** Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

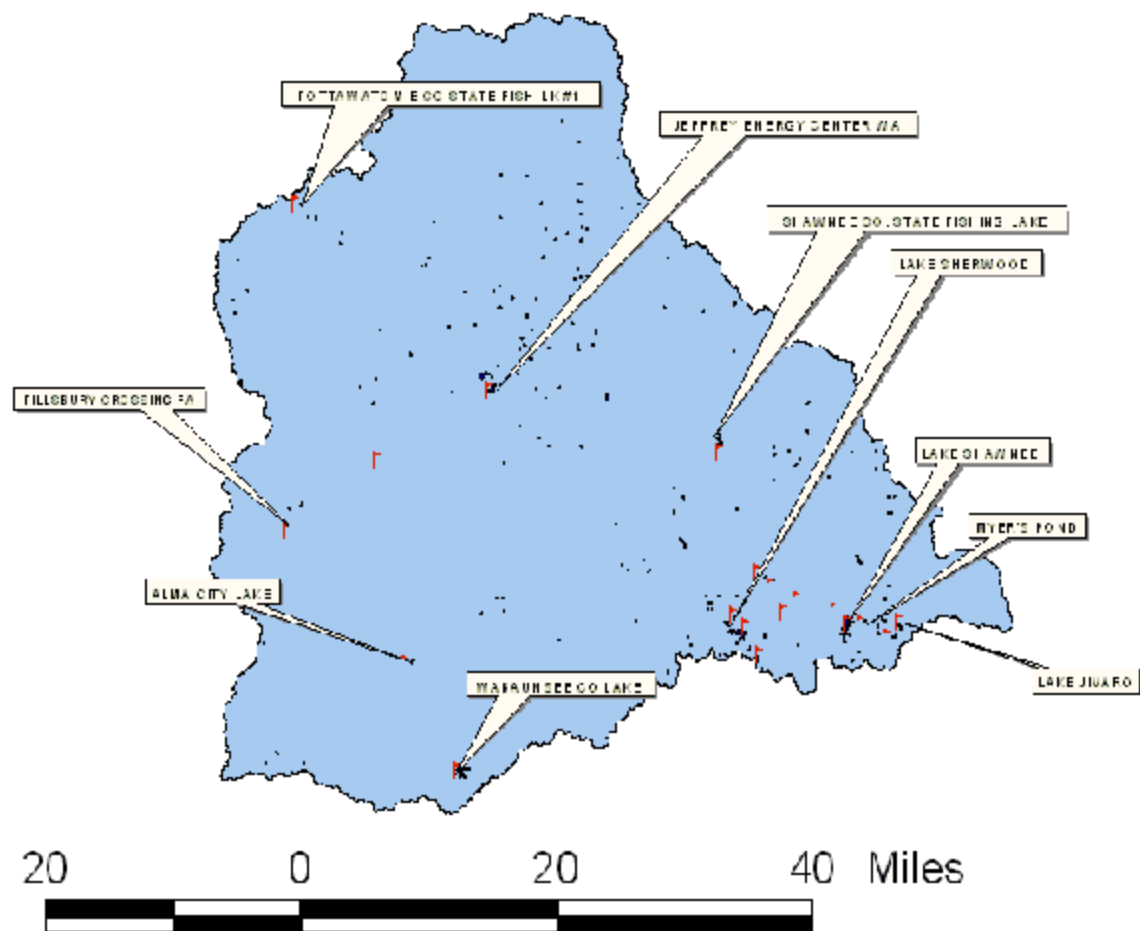
## **Attachment 1**

### **Maps**

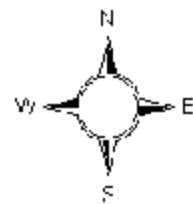
Huc -10270102- Middle Kansas  
Streams & Rivers

Streams & Rivers  
Huc 10270102

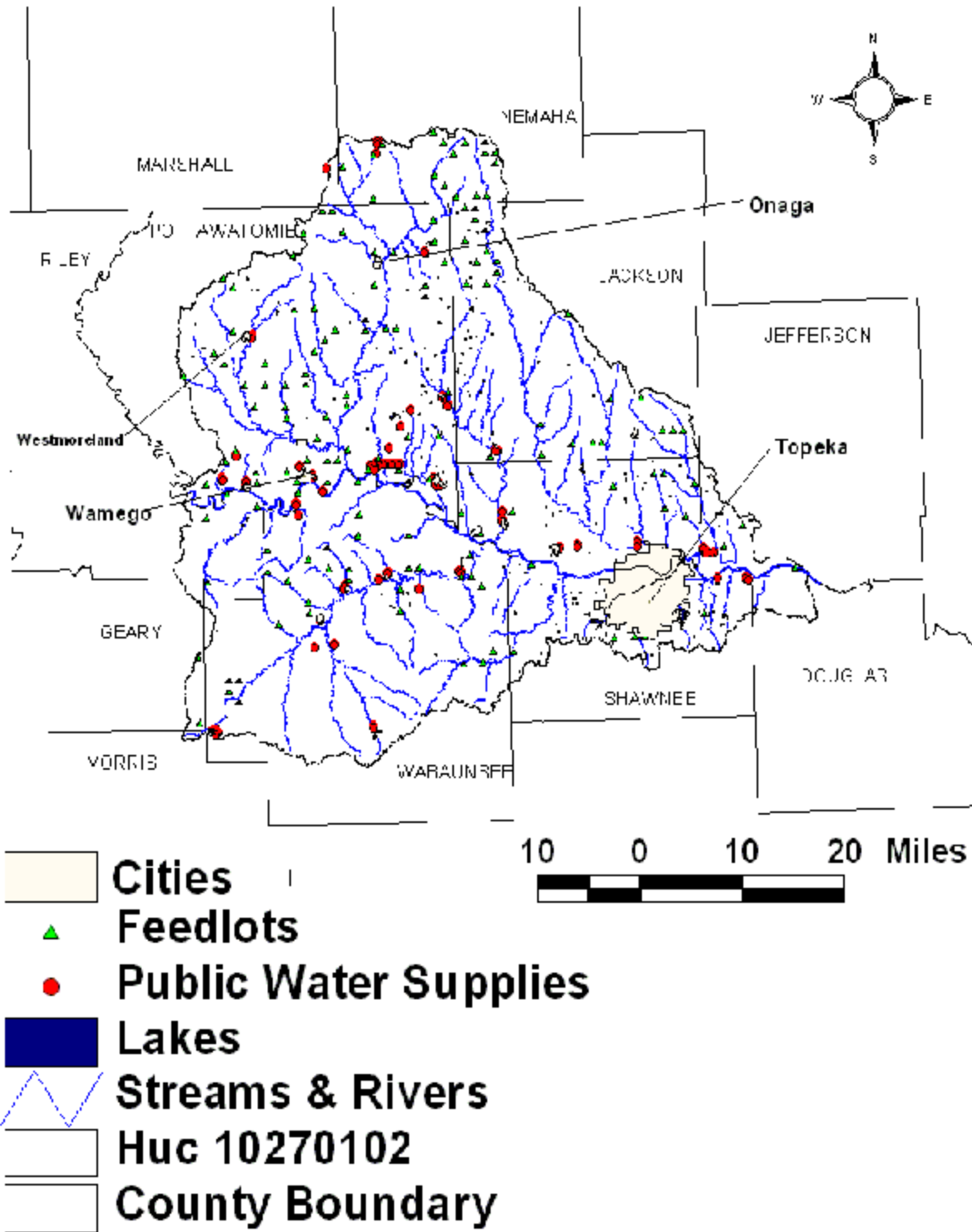
# Huc -10270102- Middle Kansas Lake Monitoring Sites



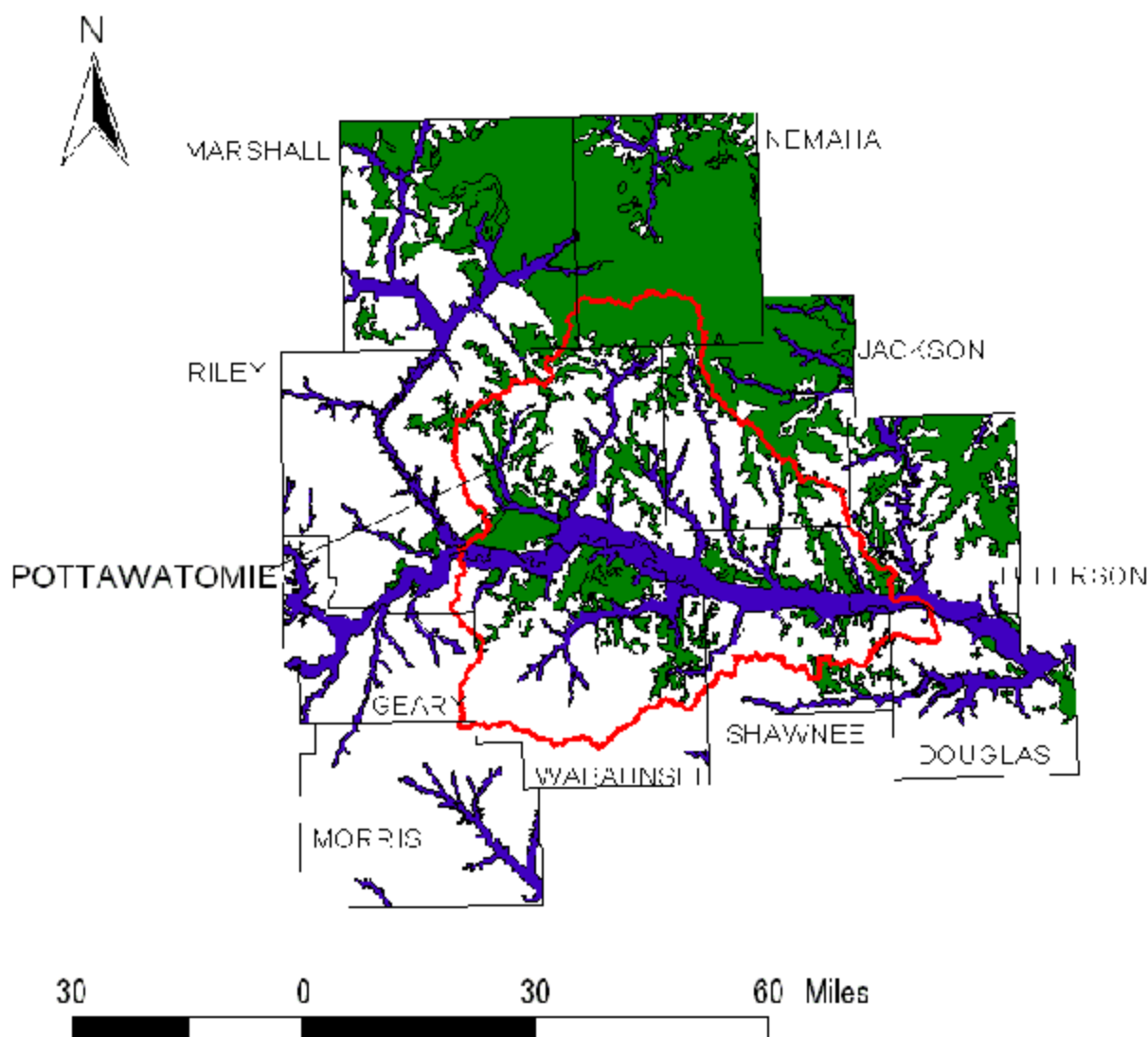
- Lake Monitoring Sites
- Lakes
- Huc 10270102



## Huc -10270102- Middle Kansas Watershed Boundary



# Huc -10270102- Middle Kansas Groundwater Aquifers



- County Boundary
- Watershed Boundary
- Alluvial Aquifer
- Glacial.shp

CR 12  
Dennis A. F. Miller  
Map of the Source Section  
10-1-2011  
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